

STATE OF MICHIGAN



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DEPARTMENT OF ENVIRONMENTAL QUALITY

"Better Service for a Better Environment"

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REPLY TO:

STORAGE TANK DIVISION
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February 26, 2001

TO: Qualified Underground Storage Tank Consultants (QCs) and Interested Parties

FROM: Roger Przybysz, Chief, Storage Tank Division

SUBJECT: Attached Revised Operational Memorandum No. 7
Identification, Reporting, and Recovery of Free Product at LUST Sites

Operational Memorandum No. 7 has been revised to further clarify requirements in Part 213, Leaking Underground Storage Tanks, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, regarding the reporting and recovery of free product. The following items summarize the changes to this operational memorandum.

- The reporting schedule for submitting Free Product Recovery Status Reports is extended from the monthly reports during the first six months to quarterly reporting. This, however, does not alleviate the requirement under Section 21308a(2)(b) of Part 213 for submitting an amended Initial Assessment Report within 30 days, whenever free product is discovered.
- The QC should present a graphical analysis depicting the trend of free product occurrence in relation to water levels. Similarly, select downgradient well concentrations should be graphed in relation to the water level to determine if the free product plume is acting as a continuing source of groundwater contamination.
- Free product baildown recovery testing is to be used as an aid in the selection of the most effective recovery method.
- When free product is no longer believed to be present, 12 monthly inspections are recommended, to account for any seasonal fluctuations, before submitting a final free product report or a request to reclassify the site.
- The Free Product Recovery Status Report form (EQP3850) is in a table of contents format to provide the QCs the flexibility to present the data in a manner that best suits them.
- Two key Environmental Protection Agency documents are listed as references, and are excellent sources for submittal examples and provide more detailed background information on this topic.

If you have any questions, please contact the Storage Tank Division project manager or district supervisor for your area.

Attachments



STORAGE TANK DIVISION

SUBJECT: Identification, Reporting, and Recovery of Free Product at LUST Sites	DATE: 2/12/96 Revised 2/26/01	Operational Memorandum No. 7 Page 1 of 5
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This Operational Memorandum provides guidance to the Department of Environmental Quality (DEQ), Storage Tank Division (STD), in the identification and removal of free product. This revised Operational Memorandum should replace the previous operational memorandum on this subject, and should be filed as Attachment 7 in your Part 213 Risk-Based Corrective Action (RBCA) General Reference Manual.

General Information and Initial Discovery of Free Product

“Free product” is defined in Section 21302(f), Part 213, Leaking Underground Storage Tanks, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Act 451), as “a regulated substance in a liquid phase equal to or greater than 1/8-inch of measurable thickness, that is not dissolved in water, and that has been released into the environment.” If free product is discovered, either at the time of the discovery of the release, or thereafter, the presence of free product must be reported to the STD within 24 hours of discovery. The report may be submitted by fax, utilizing the Free Product Fax Transmittal Sheet (EQP3800). The information that must be provided in this report includes the following:

- the person reporting the discovery;
- the name and address of the facility;
- the facility identification number;
- the date and time that free product was discovered;
- the type of product that was discovered;
- the location of the free product;
- the action taken, and free product recovery efforts initiated;
- the amount (in gallons) of free product recovered.

If free product is discovered within 90 days of the date of the release, all information required by Section 21308a(1)(b)(xviii), items (A) through (H), of Part 213, should be provided in the Initial Assessment Report (IAR) (EQP3841). If free product is discovered subsequent to submittal of the IAR, an amended IAR, including these items must be submitted to the DEQ within 30 days of discovery of the free product, as required by Section 21308a (2)(b) of Act 451.

If free product is discovered at a facility with an operating underground storage tank (UST) system, and the free product is located within the area of any existing UST system components, then tank and line tightness testing should be performed, to determine if an ongoing release is responsible for the free product discovered.

A sample of the free product may be collected for fuel type identification. This may aid in identifying the potential source of the product, as well as the relative age of the product discovered.

Delineation and Initial Removal Requirements

Section 21307(2)(c)(i) of Act 451 requires that free product removal be conducted in a manner that minimizes the spread of contamination into previously uncontaminated zones. Section 21307(2)(c)(ii) of Act 451 additionally requires that the abatement of free product migration be used as a minimum objective for the design of the free product removal system. The extent of the free product must be defined to adequately demonstrate that the free product is not migrating and that contamination is not spreading into previously uncontaminated areas. The apparent thickness of the free product plume must be determined throughout the plume in order to determine the optimum design and location for the free product recovery system.

Delineation of the free product must be completed within 90 days of the discovery of free product. Any standard field technique may be utilized for the delineation of the extent of free product, as long as the apparent product thickness in individual locations can be determined. Alternate methods for delineating the horizontal extent and apparent thickness of the free product (e.g., dielectric logging and geophysical methods) may be utilized, if appropriate.

Permanent monitoring points should be installed to verify the extent of the free product and to demonstrate the performance of the recovery system. These monitoring points should at a minimum be two-inch diameter wells, which have been properly installed and contain a filter pack. These wells need to be aggressively developed to promote movement of the product into the well screen. Larger diameter wells with increased screen slot size may enhance the recovery of free product. Accurate delineation of the extent of free product is critical to enable the design of an appropriate recovery system. The utilization of peripheral wells which do not contain free product to define the extent of free product would result in the over design of a recovery system. It is assumed that free product is present up to, but not including, the peripheral well. Removal of the free product must be initiated immediately upon discovery.

Bail-down Tests to Determine System Design

Bail-down tests should be conducted in all monitoring wells with free product to assess the appropriate interim and final recovery methods. Interim recovery methods (e.g., manual bailing, Petro TrapsTM, skimmer pumps, etc.) shall be used during the delineation of the extent of the free product to begin removal of free product and/or to prevent free product migration. It should be noted that the recharge rate of any passive recovery system is especially critical documentation of its effectiveness.

The final free product recovery system should be designed to achieve the optimum removal rate considering such factors as the site's geology and hydrogeology. Factors to address when designing the system include:

- the lateral extent of the free product (map view and included in cross-sections).
- the apparent thickness of the free product and its relation to the water table fluctuations over time displayed graphically on a hydrograph. Hydrographs should document the depth to water versus the free product thickness over time.
- the current water table elevation should be compared with the water table elevation when free product was first discovered.
- the recharge rate should be included for free product flowing into the monitoring wells (using bail-down tests).
- the amount of product released should be estimated as a maximum and minimum.
- the risks to human health and the environment (e.g., vapor migration into subsurface structures, discharges to surface water bodies) must be evaluated.

Analyzing Recovery System Effectiveness

Active free product recovery systems should be installed in most instances, although passive product recovery systems such as Petro TrapsTM may be appropriate when the amount of product present is minimal, or where active systems are not appropriate, such as in clay soils or where groundwater is limited. Manual bailing of monitoring wells is acceptable as an interim measure, but is generally not adequate as a final free product recovery measure. If passive recovery measures (e.g., Petro TrapsTM or bailing) will be utilized as a final free product recovery system, the Qualified Underground Storage Tank Consultant (QC) must provide documentation to demonstrate that this system provides for the most effective free product recovery based on site specific factors.

Techniques that Depress the Water Table

An extra level of characterization and documentation should be provided where free product recovery systems depress the groundwater table and there is mobile free product on top of the capillary fringe. Depressing the water table when mobile free product is present may enlarge the smear zone (the zone of residual product in the soil due to water table fluctuations). Some of this residual product may become trapped below a rising water table, creating a source of further groundwater contamination that is very difficult to remediate.

Vacuum enhanced recovery systems (e.g., dual or multiphase vacuum enhanced recovery systems or "bioslurping") have the potential to be an effective alternative to conventional pump and treat. However, this technology may create an upconing of the groundwater around the well, isolating that well within an envelope of water. This may result in a false negative and may also result in a larger smear zone. It should be noted that the free product will not enter the well again until it builds up enough head to

overcome the envelope of water which surrounds the well screen. Steps should be taken to properly design and operate the vacuum enhanced recovery system to prevent the upconing of groundwater around the well screen. Properly designed vacuum enhanced recovery systems can maximize the free product recovery, as well as remediate the adsorbed and dissolved phase contamination. Documentation of free product volume, groundwater volume, and vapor mass recovered during enhanced fluid recovery/vacuum extraction events should be provided to the STD.

Hydrograph Data

Verifying the effectiveness of all recovery systems requires analysis of the changes in water level measurement compared with/contrasted to the variations in the free product's apparent thickness. This data should be collected at least monthly for the first year, and presented in a hydrograph. After the initial bail-down tests, bail-down tests are recommended annually to evaluate changes in the free product's recharge rate. Use the hydrograph from the previous year to determine a time of maximum apparent thickness to conduct subsequent bail-down tests.

Reporting Procedures

Following the discovery of free product, reports on the status of the free product delineation and recovery should be submitted to the STD by the QC with the attached EQP3850. A Supplemental Report Cover Sheet (EQP3849) must accompany these reports. It is suggested that status reports be submitted quarterly. The reporting schedule may be altered at the discretion of the project manager, based on site conditions.

When free product is no longer believed to be present at the facility, monthly free product inspections should be conducted for 12 months. The EQP3850s can still be submitted quarterly. If after this 12-month period, no free product has been encountered, a final EQP3850 should be submitted which documents the dates and results of the free product inspections. This schedule may be amended by the STD project manager based on historical information. The site classification should be re-evaluated at this time.

It is not necessary to send notification to the STD district staff if free product migrates into monitor wells that have not previously contained free product. However, the STD district staff should be notified if the free product is discovered in an area that is not believed to be contiguous with the known free product plume, if the free product reappears in monitor wells following the completion of free product recovery efforts, or if the free product has migrated off-site. In these instances, the STD district staff must be notified within 24 hours of the discovery of the free product.

Questions concerning this memorandum should be directed to your STD District Supervisor.

The Operations Section Chief is responsible for the periodic review of and necessary revisions to this Operational Memorandum.

Authorization:	Date:
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Attachments:

References

Free Product Fax Transmittal (EQP3800)

Supplemental Report Cover Sheet (EQP3849)

Free Product Recovery Status Report (EQP3850)

Distribution: STD Stakeholders
STD Mailing List
DEQ Division/Office Chiefs
STD Supervisors
STD Receptionist
STD Division Chief Secretary

References

U.S. EPA, 1995. *Ground Water Issue: Light Nonaqueous Phase Liquids*, EPA/540/S-95/500, U.S. EPA Technology Innovation Office, Washington, DC.

U.S. EPA, 1996. *How to Effectively Recover Free Product at Leaking Underground Storage Tank Sites: A Guide for State Regulators*, EPA/510/R-96/001, U.S. EPA National Risk Management Research Lab, Cincinnati, OH.